Amendments to the Claims

1. (original) A method of correcting optical coherence tomography (OCT) data obtained from a layered media having at least one interface, said method comprising:

from the obtained OCT data, identifying the at least one interface; and

correcting the OCT data for distortion at the at least one interface.

2. (original) The method according to claim 1, wherein the distortion at the at least one interface is refraction.

3. (original) The method according to claim 2, wherein correcting the OCT data for refraction includes:

determining a minimum optical pathlength for a plurality of points corresponding to the obtained OCT data; and

transforming the determined minimum optical pathlength into a physical pathlength.

4. (original) The method according to claim 3, wherein the transforming step includes a backwards transformation.

5. (currently amended) ~~The~~ A method ~~according to claim 2~~ of correcting optical coherence tomography (OCT) data obtained from a layered media having at least one interface, the method comprising:

from the obtained OCT data, identifying the at least one interface; and

correcting the OCT data for distortion at the at least one interface, wherein identifying the at least one interface includes:

transforming the obtained OCT data into a binary image;

searching a plurality of OCT image data columns sequentially for upper and lower boundaries of the at least one interface;

based on the searching step, assigning interface data points based on a set of predetermined rules regarding the at least one interface;

applying a first predetermined geometric fit to the assigned interface points of the at least one interface;

applying a plurality of predetermined rejection rules to the assigned interface points;

rejecting assigned interface points according to the predetermined rejection rules; and

applying a second predetermined geometric fit to any remaining assigned interface points.

6. (original) The method according to claim 2, further comprising:

removing image distortions due to at least one of (i) nonlinear axial scan velocity, (ii) nonlinear lateral scan velocity, and (iii) non-telecentric scan geometry.

7. (original) The method according to claim 2, wherein the OCT data is corrected using one of (i) forward mapping and (ii) backward mapping.

8. (original) The method according to claim 3, wherein the layered media is the eye.

9. (original) The method according to claim 8, wherein the at least one interface includes an epithelial interface.

10. (original) The method according to claim 9, wherein the at least one interface further includes an endothelial interface.

11. (original) The method according to claim 10, wherein identifying the at least one interface includes:

transforming the obtained OCT data into a binary image;

searching a plurality of OCT image data columns sequentially for (i) the epithelial interface, (ii) the endothelial interface, and (iii) the iris;

based on the searching step, assigning data points as being indicative of the epithelial interface based on a set of predetermined rules regarding the (i) epithelial interface, (ii) the endothelial interface, and (iii) the iris;

applying a first parabolic fit to the assigned data points indicative of the epithelial interface;

applying a plurality of predetermined rejection rules to the assigned interface points;

rejecting assigned interface points according to the predetermined rejection rules; and

applying one of (i) a second parabolic fit and (ii) a quadrabolic fit to any remaining assigned interface points, said fit being indicative of the epithelial interface.

12. (original) The method according to claim 11, wherein the predetermined rules regarding the (i) epithelial interface, (ii) the endothelial interface, and (iii) the iris include at least one of the following:

(a) the epithelial and endothelial interfaces are smooth curves that are, to a first approximation, parabolic;

(b) the epithelial and endothelial interfaces are both concave inward;

(c) the endothelial interface lies at least 0.3mm below the epithelial interface;

(d) the iris is disposed below the endothelial interface;

(e) an anterior chamber is greater than about 0.1mm deep, said endothelial interface and said iris meeting in the anterior chamber angles; and

(f) a lens capsule is apparent within the iris lumen.

13. (original) The method according to claim 12, wherein the predetermined rejection rules include at least one of the following:

(a) reject interface data points more than a predetermined distance apart from the first parabolic fit;

(b) reject data points without immediate left and right neighboring data points;

(c) reject data points that, along with neighboring data points, are within a top 0.1mm of the overall image;

(d) reject iris points about estimated endothelial and epithelial interfaces and below estimated iris; and

(e) for iris data points, replace vertical positions by the median of neighborhood data points.

14. (original) The method according to claim 11, wherein transforming the obtained OCT data into a binary image includes:
thresholding the data points about four standard deviations above a determined noise floor.

15. (original) A quantitative image correction method for optical coherence tomography (OCT), said method comprising:

correcting for external distortions caused by scan geometry; and

correcting for intrinsic distortions within a sample.

16. (original) The method according to claim 15, wherein the intrinsic distortions are caused by refraction at at least one interface within the sample.

17. (original) The method according to claim 16, wherein correcting for external distortions includes correcting for non-telecentric image distortions.

18. (original) The method according to claim 16, wherein correcting for external distortions includes correcting for distortions caused by at least one of (i) nonlinear axial scan velocity and (ii) nonlinear lateral scan velocity.

19. (original) The method according to claim 15, wherein correcting for internal distortions includes:

identifying the at least one interface in the OCT image; and

correcting OCT data for distortion at the at least one interface.

20 (currently amended) ~~The~~ A quantitative image correction method ~~according to claim 19~~ for optical coherence tomography (OCT), the method comprising:

correcting for external distortions caused by scan geometry; and

correcting for intrinsic distortions within a sample by identifying the at least one interface in the OCT image and correcting OCT data for distortion at the at least one interface, wherein identifying the at least one interface includes:

transforming the obtained OCT data into a binary image;

searching a plurality of OCT image data columns sequentially for upper and lower boundaries of the at least one interface;

based on the searching step, assigning interface data points based on a set of predetermined rules regarding the at least one interface;

applying a first predetermined geometric fit to the assigned interface points of the at least one interface;

applying a plurality of predetermined rejection rules to the assigned interface points;

rejecting assigned interface points according to the predetermined rejection rules; and

applying a second predetermined geometric fit to any remaining assigned interface points.

21. (original) A non-invasive system for imaging an anterior portion of an eye, said system comprising:

an optical coherence tomography (OCT) data acquisition system; and

an OCT data correction processor which (i) receives OCT data from the OCT data acquisition system, (ii) automatically segments anatomical structures in the anterior portion of the eye to detect at least one interface, and (iii) corrects for refraction effects at the at least one detected interface.

22. (original) The system according to claim 21, wherein the OCT data acquisition system includes:

an optical radiation source;

a reference arm and a sample arm each coupled to the optical radiation source via a beam splitter; and

a detector coupled to the beam splitter for receiving optical radiation from the sample arm and the reference arm.

23. (original) The system according to claim 21, wherein the OCT data correction processor removes image distortions due to at least one of (i) nonlinear axial scan velocity, (ii) nonlinear lateral scan velocity, and (iii) non-telecentric scan geometry.

24. (original) The system according to claim 21, wherein the OCT data correction processor automatically segments anatomical structures in the anterior portion of the eye to detect at least one interface by:

transforming the obtained OCT data into a binary image;

searching a plurality of OCT image data columns sequentially for (i) the epithelial interface, (ii) the endothelial interface, and (iii) the iris;

based on the searching step, assigning data points as being indicative of the epithelial interface based on a set of predetermined rules regarding the (i) epithelial interface, (ii) the endothelial interface, and (iii) the iris;

applying a first parabolic fit to the assigned data points indicative of the epithelial interface;

applying a plurality of predetermined rejection rules to the assigned interface points;

rejecting assigned interface points according to the predetermined rejection rules; and

applying one of (i) a second parabolic fit and (ii) a quadrabolic fit to any remaining assigned interface points, said fit being indicative of the epithelial interface.

25. (original) A non-invasive method for imaging an anterior portion of an eye, said method comprising:

obtaining optical coherence tomography (OCT) data from the eye;

from the obtained OCT data, determining a position of (I) the epithelium, (ii) the endothelium and (iii) the iris; and

correcting image data distortions caused by at least one of (i) a first interface including the epithelium and (ii) a second interface including the endothelium.